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HEADQUARTERS AIR FORCE ENGINEERING AND SERVICES CENTER
TYNDALL AFB, FLORIDA 32403

OFFICE OF PUBLIC AFFAIRS
(904) 283-6476

HERBICIDE ORANGE/DIOXIN REMOVAL TEST AT NAVAL CONSTRUCTION BATTALION CENTER

PROJECT DESCRIPTION

The Air Force Engineering and Services Center Environics Laboratory is conducting a 90-day trial of a full-scale, modular, transportable incineration system at the Naval Construction Battalion Center (NCBC), Gulfport, Miss., beginning in Sept 1986. The test will provide data on the reliability, maintainability, and costs for this type of treatment method for removing contaminants from soil. This is not a "proof-of-concept" test; the concept was proven in certification trials, sponsored by the U.S. Environmental Protection Agency (EPA), at Eldorado, Ark.

The test is part of the research effort dedicated to finding ways to clean-up hazardous waste sites at Air Force bases, under the Installation Restoration Program. Previous tests at the NCBC site were small-scale technology demonstrations. Because of the size of the NCBC site (approximately 13 acres), it was chosen for the full-scale demonstration and test.

The field trial will treat more than 9,000 tons of Herbicide Orange-contaminated soil, on a 24-hour-a-day basis. One side benefit will be the potential for complete site restoration.

Although the test of the incinerator is targeted for dioxin treatment, the incineration technology could be used to clean-up other hazardous wastes at other DoD installations, if proven successful and cost-effective.

PROJECT OUTLINE/SEQUENCE

The size, scope, and nature of this test requires extensive safety precautions and pre-operation calibration; a time consuming process.

The incinerator system, and its associated control equipment will require 13 semi-trailer loads of material, three of which are out-sized.

Site preparation will take about 60 days to set-up the various office trailers and laboratories, and prepare the foundation for the incinerator.

Set-up of the incinerator will take approximately 60 days running concurrently with the support equipment set-up. There is also a requirement to calibrate and cold test both the individual safety devices and components, and the entire system prior to any test run with soil.

After completion of the cold test, a hot test for temperature calibration is run without soil, followed by a hot test with clean soil (soil known to be free from contamination).

Following complete verification of the system calibration, three trial burn tests with contaminated soil will take place, using 3, 4, and 5 tons of contaminated soil, to check system integrity. Samples taken from the treated soil, exhaust stack, and scrubber water will be sent to laboratories for testing, during which time the system will be shut down.

Upon completion of the lab tests and validation, the results will be reviewed by the Air Force and the EPA. If still within the operating parameters established for the system, re-calibration of the incinerator will begin, followed by the 90-day test. Treatment of the 9,000 tons of soil needed for the test will be conducted, along with sampling for various compounds which may result from the incineration process. Testing of each run during a 24-hour period will verify the treatment/removal of the dioxin contaminant.

Following completion of the burn period, all equipment used in the test will be decontaminated, the test site closed, and the incinerator removed from NCBC.

The Idaho National Engineering Laboratory (Dept of Energy) will prepare a comprehensive report of the viability, maintainability, reliability, and costs associated with the project. The field-trial report is to be delivered to HQ AFESC and the Defense Technical Information Center, for further release to interested parties. (DoE's INEL is a co-sponsor of, and prime contractor for, the research.)

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QUESTIONS AND ANSWERS: HERBICIDE ORANGE
REMOVAL TEST AT NCBC

1. Who is conducting the test?

ANSWER: The test is being conducted by the Air Force Engineering and Services Center Environics Laboratory, Tyndall AFB, Fla.

2. Where is the test being conducted?

ANSWER: The site is located on approximately 13 acres in the middle of the Naval Construction Battalion Center, Gulfport, Miss.

3. What is the purpose of the test?

ANSWER: The test is designed to determine if in-place incineration of hazardous waste is reliable, maintainable, and cost effective; the specific material being tested for is dioxin, a contaminant of Herbicide Orange.

4. When will the test be conducted?

ANSWER: The test will run from August 1986 to April 1987.

5. How will the test be conducted?

ANSWER: The test involves an EPA-approved high temperature incinerator operating at 1600-1800 degrees farhenheit, 24-hours a day for 90 days. Approximately 9,000 tons of material from the site will be burned to obtain efficiency and cost data. Continuous and periodic monitoring is part of the system test. Contaminated soil from a Herbicide Orange storage site will be fed into the incinerator, treated, tested, and returned to its original location. Management, scientific and engineering data will be collected and analyzed throughout the test period.

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6. Who else is involved?

ANSWER: The Idaho National Engineering Laboratory of the Department of Energy will act as the prime contractor, using its GOCO contractor, EG/G, Idaho. EG/G was selected because of its work on similar projects, and for its overall management expertise.

7. How is the project funded?

ANSWER: The funds come from the Defense Environmental Restoration Fund, as appropriated by Congress, for the clean-up of hazardous waste sites found on DoD installations.

8. Why is the project being conducted at NCBC?

ANSWER: NCBC was chosen because of the amount of soil available for testing. It was a storage and trans-shipment site for Herbicide Orange during the Vietnam war. When the DoD ordered the cessation of use in 1971, the remaining stocks were stored at NCBC. Over time, some deterioration of the 55-gallon drums occurred, resulting in leaks of the herbicide. The dioxin contamination was an unwanted by-product of the manufacturing process and that is the main contaminant in the NCBC soil. Further, the type of soil matrix was perfect for the test; it contains pea gravel, sand, asphalt, shells, and concrete-stabilized soil. The spills also occurred when the material was redrummed for shipment to an incinerator ship, for subsequent burning at sea, in 1977. The spills from all operation are about 6-8 inches in diameter and about 6-10 inches deep.

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9. Were permits required for the project?

ANSWER: Region 4, U.S. Environmental Protection Agency has issued a Research, Development and Demonstration permit as required by the Resource Conservation Recovery Act.

10. Who reviewed the permits?

ANSWER: The permits were reviewed by the HQ EPA Dioxin Disposal Advisory Group, the Mississippi Bureau of Pollution Control, Region 4 (EPA), the Navy and the Air Force. The documents are (and have been) available for public review and comment in the Gulfport, Miss., public library.

11. What environmental assessment was performed?

ANSWER: An investigation of the site returned a finding of no significant environmental impact, because the area has been fenced and unused since 1977. The nature of the soil prevents spread of the contamination. The assessment also indicated that the project would result in the removal of toxic wastes from the environment.

12. Why was incineration selected as the removal process?

ANSWER: The Air Force contracted for comprehensive R&D lab studies on thermal desorption of dioxins from the NCBC soils. The studies determined what it takes to get the dioxin off the soil. The data identified the time vs. temperature requirements for destruction, and supported the incineration concept. Two earlier small scale demonstrations at NCBC supported the conclusion.

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13. Who will perform the incineration?

ANSWER: ENSCO, Inc. (Environmental Services Company) owns the process which will be used. Their incinerator was tested in a RCRA-mandated burn test conducted by the EPA, and resulted in a greater than 99.9999 percent destruction/removal efficiency. The test exceeded all EPA standards, and the data submitted to Region 4 (EPA) and the State of Mississippi Department of Natural Resources supported the granting of the R&D permit for this project. The materials burned in that test were selected because they are harder to destroy by incineration than dioxins. The incinerator is sanctioned by EPA.

14. What other analysis was conducted?

ANSWER: Complex chemical analysis was conducted to characterize the soil at the NCBC site. From that data it was determined that the system parameters of the ENSCO incinerator would be adequate to remove the dioxin contamination.

15. Will there be an environmental monitoring?

ANSWER: Several types of monitoring will be conducted throughout the test period; ambient air quality, process (within the incinerator), soil, scrubber water, and stack gasses.

16. How will the air be monitored?

ANSWER: Ambient air quality monitoring will consist of stations placed around the test site to measure the ambient air quality for

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airborne particulates. The equipment uses high volume air samplers and will be continuous during operations.

17. How will the soil be monitored?

ANSWER: The system monitors the process throughout. Treated soil will be held until analysis is complete; if found to be clean, it will be returned to its original location. There will be multiple daily samples for analysis for dioxin content. As dirt is removed from each 20x20 foot plot, the soil remaining will be tested to be sure all the contamination has been removed. Excavation will then proceed to the next plot.

18. Is water used? If so, how will it be monitored?

ANSWER: Process water will be used for scrubbing the air used in the combustion process. Daily samples will be taken and held until analysis is complete. Treated water will be filtered through activated carbon until clean enough to dispose of normally.

19. Is there other air quality monitoring?

ANSWER: Operational exhaust stack gas analysis will be continuous for oxygen, carbon dioxide, carbon monoxide, and nitrous oxide. All are required for proper combustion of the contaminants. Additionally, hydrochloric acid will be scrubbed from the stack gas and neutralized with bicarbonate. While trace amounts may not be removed, what remains will be well under the EPA emission standards. As tested earlier, the soil contains such low levels of

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chlorine, the quantities of hydrochloric acid which would result from thermal treatment of the contaminated soil will be very small.

20. What other monitoring will there be?

ANSWER: While the kiln is in operation, there will be continuous testing and monitoring of the elements needed for complete combustion. There are numerous computer controlled set-points which meet required parameters, and safety interlocks (including manual back-up systems) which will shut down the operation if any fall below the required levels. The system is designed to operate at 400 degrees high than required to remove dioxin from the soil, and the residence time of the material is also longer than required.

21. What other reviews or validations are there?

ANSWER: Each system component will be calibrated and tested as it is installed. Then the entire system will be checked as a system. Test burns with "clean" soil and with contaminated soil, both using the NCBC soil matrix, will be conducted to validate the system integrity prior to full-scale operation. This review will include complex chemical analysis of the stack gasses, the treated soil, and the scrubber water. Upon validation the full-scale operation will begin.

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22. Will there be checks for other hazardous chemicals?

ANSWER: AFESC has developed a list of possible chemical compounds which may be present in the NCBC soil matrix, based on previous analysis, and thorough review of Table 8, RCRA. Any possible chemicals which could be produced by combustion will be tested for in the soil, air, and water produced by the incineration process. Also based on earlier tests, will be analysis of compounds which may not appear in Table 8.